

Welding and Joining Technology

Capabilities in welding and joining technology to solve the most challenging joining problems

The LLNL Joining Group can provide welding and joining technology to meet a wide range of fabrication and performance requirements.

Facilities for joining conventional and nonconventional materials

Our integrated facilities allow us to develop and perform joining operations that meet tight dimensional tolerances and severe service requirements. As a support group for all Laboratory programs, we have developed the ability to join many different kinds of materials:

- All common structural metals and alloys
- Refractory metals and alloys
- Ceramics and glasses
- Composite materials
- Toxic and radioactive alloys.

Unequaled skills and experience

- State-of-the-art equipment and facilities
- Personnel experienced in weld design and tooling
- Metallurgical expertise in materials selection and compatibility
- Advanced characterization capabilities
- Experience in weldability and performance testing.

APPLICATIONS

- Precision fusion welding using laser and electron beam processes
- Joining of dissimilar materials by vacuum brazing, diffusion bonding, and friction bonding
- Joining of hazardous materials such as beryllium and radioactive materials such as uranium

Demonstrated technologies

Our capabilities for metallurgical analysis of the problem, materials selection and weldability testing, tooling and process development, and limited production of prototype hardware enable us to solve the most challenging joining problems. Successfully demonstrated advanced joining technologies include

- Vacuum brazing and solid-state bonding:
 - Diffusion brazing thin silicon substrates to Kovar

- Diffusion bonding of ultrathin beryllium to metallic substrates
- Composite diamond fabrication by braze infiltration
- Diffusion brazing of advanced intermetallic compounds
- Ceramic to metal bonding
- Laser processing:
 - Joining of ultrathin components with Nd:YAG lasers
 - Precision high-speed hole drilling with copper-vapor lasers
 - Precision joining
 - Laser brazing
- Electron beam processing:
 - Deep penetration welds
 - Distortion minimization
 - Refractory metal welding
 - Tomographic beam profiling
 - Surface modification
- Friction welding:
 - Joining of widely dissimilar metals
 - Refractory metal bonding
 - Particulate composite joints.



A custom feature allows us to bond 11,2-cm o.d. copper rings in a single thermal cycle.

Availability: Available now. We invite industry, small businesses, and government agencies to contact us regarding potential collaborations.

Contact

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